

**Notice of Allowability**

Application No.

10/723,851

Applicant(s)

MAHE ET AL.

Examiner

James S. Wozniak

Art Unit

2626

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to The telephone interview from 10/5/2007.
2. ☒ The allowed claim(s) is/are 1 and 2-13 (now claims 1-12).
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some\* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Notice of Informal Patent Application                                |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                              |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance             |
|  | 9. <input type="checkbox"/> Other _____  |

## **DETAILED ACTION**

### ***Response to Amendment/Interview***

1. In response to the office action from 6/6/2007, the applicant has submitted an amendment, filed the 9/6/2007, amending independent claims 1 and 9, while arguing to traverse the art rejection based on the motivation for combining the prior art of record and the amended claim 1 limitations regarding the constitution of speaker classes in combination with the other elements the claim (*Amendment, Pages 15-17*). Although such arguments were convincing, they were also applied to claim 9 (*Amendment, Page 17*), which did not include all of the added limitations of claim 1. After conducting an interview with the applicant's representative (see below), claim 9 is amended below via examiner's amendment to include the further limitations of claim 1. As such, and for the reasons given below, claims 1 and 3-13 are allowable over the prior art of record.

2. In response to the amended drawings, specification, and claims, the previous objections and 35 U.S.C. 112, first paragraph rejections have been withdrawn.

## **EXAMINER'S AMENDMENT**

3. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR

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1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Edward Weisz (*Reg. No. 37,257*) on 10/5/2007.

4. The application has been amended as follows:

Amend claim 9 as follows:

9. (Currently Amended) A system for correcting voice spectral deformations introduced by a communication network, comprising adapted equalization means in a frequency band, ~~the system~~ said adapted equalization means comprising:

a digital filter having a frequency response which is a function of a ratio between a reference spectrum and a spectrum corresponding to a long-term spectrum of a voice signal; and

signal processing means for ~~processing the voice signal to calculate~~ calculating coefficients of ~~[[a]] the digital signal filter~~; said signal processing means for ~~processing the voice signal~~ including:

a first signal processing unit for calculating a modulus of a frequency response of an equalizer filter restricted to an equalization band according to the following relationship:

$$|EQ(f)| = \frac{1}{|S\_RX(f)L\_RX(f)|} \sqrt{\frac{\gamma_{ref}(f)}{\gamma_x(f)}},$$

wherein  $\gamma_{ref}(f)$  is the reference spectrum, which may be different from one speaker to another and which corresponds to a reference for a predetermined class to which a speaker belongs,  $L\_RX$  is a frequency response of a reception line,  $S\_RX$  is the frequency response of a reception signal and  $\gamma_x(f)$  is the long-term spectrum of an input signal of the filter; and

a second signal processing unit for calculating a pulsed

response from the calculated frequency response modulus to determine coefficients of the equalizer filter differentiated according to the class of the speaker constitution of different speaker classes; wherein the classes of speakers are determined by selecting a corpus of N speakers recorded under non-deteriorated conditions, determining a long-term frequency spectrum of the N speakers of the selected corpus, classifying the speakers of the corpus according to their partial cepstrum by applying a predefined classification criterion to these cepstra to obtain K classes, and calculating the reference spectrum associated with each class to obtain the voice reference corresponding to each of the classes; and wherein a partial cepstrum of a speaker is calculated from the speaker's long-term spectrum restricted to the equalization band.

*Allowable Subject Matter*

5. **Claims 1 and 3-13** are allowable over the prior art of record.

6. The following is an examiner's statement of reasons for allowance:

With respect to **Claims 1 and 9**, the prior art of record fails to explicitly teach or fairly suggest, either individually or in combination, a method/system for correcting speech timbre distortions resulting from transmission over a communication network using an equalization filter by classifying a speaker of an incoming speech signal to a closest speaker class constitution as defined in claims 1 and 9 (*i.e., constitution of different speaker classes (see Specification, Pages 22-25); wherein the classes of speakers are determined by selecting a corpus of N*

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*speakers recorded under non-deteriorated conditions, determining a long-term frequency spectrum of the N speakers of the selected corpus, classifying the speakers of the corpus according to their partial cepstrum by applying a predefined classification criterion to these cepstra to obtain K classes, and calculating the reference spectrum associated with each class to obtain the voice reference corresponding to each of the classes; and wherein a partial cepstrum of a speaker is calculated from the speaker's long-term spectrum restricted to the equalization band (see Specification, Page 21, equation 0.4)), and performing equalization filtering on the received speaker's voice using a reference spectrum corresponding to the selected speaker class (see Specification, Page 14).*

Pertinent prior art:

Although Mahé et al ("*Correction of the Voice Timbre Distortions on Telephone Network*," 2001) discloses a process to compensate for channel effects based on a long-term spectrum average for a particular speaker (*Sections 3.2-3.3*), Mahé does not teach the use of a generic spectral average based on a class to which a speaker belongs, as defined in claims 1 and 9.

Although, Ittycheriah et al (*U.S. Patent: 5,895,447*) recites speaker class dependent models used to identify the class of a particular speaker and perform further speech recognition processing based on that determination (*Col. 5, Line 59- Col. 6, Line 10; and Col. 7, Lines 39-50*), Ittycheriah does not teach speaker class-based classification for performing equalization of a channel degraded signal. Even if combined with the equalization process taught by Mahé, the combination of references still does not teach the constitution of speaker classes as it is defined in claims 1 and 9.

Although Buhrke et al (*U.S. Patent: 5,806,029*) discloses class-based bias selection to perform equalization to correct for channel distortion (*see Fig. 1, channel distortion; and Fig. 5, Elements 46, 48, and 50*), Buhrke does not disclose the constitution of classes as it is defined in claims 1 and 9.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***


7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: See PTO-892.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached at (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James S. Wozniak  
10/30/2007



PATRICK N. EDOUARD  
SUPERVISORY PATENT EXAMINER